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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,167	09/11/2003	Paul Reuben Day	ROC920030144US1	7591
30206	7590	03/22/2006	EXAMINER	
IBM CORPORATION ROCHESTER IP LAW DEPT. 917 3605 HIGHWAY 52 NORTH ROCHESTER, MN 55901-7829			PHAM, MICHAEL	
			ART UNIT	PAPER NUMBER
			2167	
DATE MAILED: 03/22/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/660,167		DAY ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Michael D. Pham		2167	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 September 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 9/11/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**Detailed Action**

1. Claims 1 - 23 have been examined.
2. Claims 1 - 23 are pending.
3. Claims 1 - 23 are rejected as detailed below.

***Priority***

Application has not claimed domestic or foreign priority and therefore has been examined with an effective filing date of 9/11/2003.

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***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1 and 3-6 are rejected under 35 U.S.C. 101 because in claim 1, a tangible result is not attained after generating bitmaps by setting values to inactive and active values. Further, reasoning active values and inactive values are directed to just data manipulation per se and as a result does not set forth a practical application to produce a real world result. All other claims are rejected under 101 for failing to solve the deficiencies of claim 1 from which it depends.

It is noted that by incorporating claim 2 into claim 1 it fixes the problem because it causes table entries to be avoided if they correspond to inactive values.

Art Unit: 2167

Claims 15, and 17-18 are rejected under 35 U.S.C. 101 because in claim 15, a tangible result is not attained after generating bitmaps by setting values to inactive and active values. Further, reasoning active values and inactive values are directed to just data manipulation per se and as a result does not set forth a practical application to produce a real world result. All other claims are rejected under 101 for failing to solve the deficiencies of claim 15 from which it depends.

It is noted that by incorporating claim 16 into claim 15 it fixes the problem because it causes table-entries to be avoided if they correspond to inactive values.

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Claims 7-9 and 11-14 are rejected under 35 U.S.C. 101 because in claim 7 a tangible result is not attained after generating bitmaps by setting values to inactive and active values. Further, reasoning active values and inactive values are directed to just data manipulation per se and as a result does not set forth a practical application to produce a real world result. All other claims are rejected under 101 for failing to solve the deficiencies of claim 7 from which it depends.

It is noted that by incorporating claim 10 into claim 7 it fixes the problem because it causes table entries to be avoided if they correspond to inactive values.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2167

Claim 1, 7, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1 and 15, active and inactive values are indefinite and thus it appears that a bitmap is not accurately produced.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

***Claims 1-13 and 15-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in Background of Specifications (hereafter Background) further in view of U.S. Patent 5,560,007 by Lam Thai (hereafter Thai).***

**Claim 1:**

The Background discloses a method for reducing input/output activity when running a database query, comprising the steps of:

**executing the query on a plurality of table entries in a table using a bitmap having a respective element associated with each table entry**[Background, page 3 lines 25-28. A bitmap consists of a vector of 1-bit elements in each element corresponds to a row of a table.];  
and

The background also discloses while executing the query it typically scans the index and builds a bitmap by setting each bitmap element to either a 1 or a 0 depending on the corresponding row of the column that satisfies the selection criteria (i.e. **concurrently with executing the query** it sets a bitmap); however the background does not explicitly disclose **generating the bitmap by initially setting a plurality of elements to an active value and selectably setting respective elements that are associated with entries that do not satisfy a portion of the query to an inactive value.**

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On the other hand, Thai discloses that when a bitmap is created each bit is set to a 1 (it is assumed at the outset that all records meet the specified query condition, i.e. initialized to an active value) [Col. 9 lines 63-65]. Further when the table is scanned, records determined to not meet the query condition are removed from the bitmask (e.g. their corresponding bit is toggled from 1 to 0, i.e. inactive value) [Col. 9 lines 66-67 to Col. 10 lines 1-2].

Both inventions are directed towards optimizing queries of a database system. Thus, it would have been obvious to one of ordinary skill at the time the invention was made to have modified the Background to have included **generating the bitmap by initially setting a plurality of elements to an active value and selectably setting respective elements that are associated with entries that do not satisfy a portion of the query to an inactive value.** A skilled artisan would have been motivated to do so for the purpose of restricting the system to only those records that satisfy the query condition[Thai, Col. 10 lines 2-4].

**Claim 2:**

The method according to claim 1, further comprising the step of:

**avoiding retrieval of a table entry after its corresponding bitmap element is set to an inactive value** [Background, page 4 lines 8-11. Entirely avoids retrieving “0” entries, in other words, “inactive” values.].

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**Claim 3:**

The method according to claim 1, further comprising the steps of:

**building an index over a column of the table** [Background page 3 lines 27-28. Bitmaps are particularly useful in searching table columns over which an index has been built for a particular selection criteria. ]; **and**

**determining whether each table entry satisfies the portion of the query based on the index** [Background Page 4 lines 1-4, “..scans the index and then builds the bitmap by setting each bitmap element to either a ‘1’ or a ‘0’ depending on whether the selection criteria is met.”].

**Claim 4:**

The method according to claim 3, further comprising the steps of:

**scanning the table according to a first order<sup>1</sup> when executing the query** [Thai, Col. 9 lines 66-67 to Col. 10 lines 1-2, scans a table when executing a query.]; and

**scanning the index according to a second order<sup>2</sup> when determining whether each table entry satisfies the portion of the query** [Thai, Col. 10 lines 2-4. On subsequent query operations performed for the expression the system may restrict itself to those records remaining in the set. That is, it scans the bitmapped index to determine whether the portion of the query satisfied table entries].

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**Claim 5:**

The method according to claim 1, further comprising the steps of:

**retrieving a particular table entry having its corresponding bitmap element set to an active value** [Thai, Col. 9 lines 63-65, Scans table entries set to an active value ]; and

**determining if the particular table entry satisfies the query** [Thai, Col. 9 lines 66-67 to Col. 10 lines 1-2, If it does not satisfy change the 1 to a 0.].

**Claim 6:**

The method according to claim 5, further comprising the step of:

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<sup>1</sup> First order not in specifications. Examiner broadly interprets as scanning a table when executing a query.

<sup>2</sup> Second order not in specifications. Examiner broadly interprets as scanning an index for entries that satisfied the query.



**returning, as part of a result set, the particular table entry if it satisfies the query**

[Background, page 4 lines 8-11. Contains I/O activity. Therefore, must return a result of a query.].

**Claim 7:**

**The Background discloses a method for executing a query that evaluates one or more records of a table according to predetermined selection criteria, comprising the steps of:**

**running a first task that individually retrieves each of the one or more records from**

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**storage according to whether the corresponding element of the bitmap has an active value**

[Background page 4 lines 9-11, if records have 0(inactive entries then it can avoid retrieving.

Whereas the contra positive would be that if it cannot avoid retrieving then the records must be active entries.];

**running, concurrently with the first task, a second task that updates the bitmap by setting to an inactive value the respective element of the bitmap corresponding to any record that does not satisfy at least a portion of the selection criteria [Background, page 4 lines 1-8, sets the bit map element to 0 if selection criteria is not met.]; and**

However the background does not explicitly disclose, **initializing a bitmap wherein each element of the bitmap corresponds to a record of the table and each element is initialized to an active value and continuing to run the first task until all records from the table, having a corresponding active-value bitmap element, have been retrieved from storage.**

Art Unit: 2167

On the other hand, Thai discloses that when a bitmap is created each bit is set to a 1 (it is assumed at the outset that all records meet the specified query condition, i.e. initialized to an active value) [Col. 9 lines 63-65]. Further, Col. 4 lines 24-27, since all records meet filtered conditions (i.e. are set to active value of 1), all records must be checked and have a corresponding bitmap.

Both inventions are directed towards optimizing queries of a database system. Thus, it would have been obvious to one of ordinary skill at the time the invention was made to have modified the Background to have included **initializing a bitmap wherein each element of the bitmap corresponds to a record of the table and each element is initialized to an active value and continuing to run the first task until all records from the table, having a corresponding active-value bitmap element, have been retrieved from storage.** A skilled artisan would have been motivated to do so for the purpose of determining those records which no longer need to be retrieved and re-examined [Thai, Col. 4 lines 29-32].

**Claim 8:**

**The method according to claim 7, wherein the step of running the first task includes the steps of:**

**determining if a retrieved record satisfies the selection criteria** [Background, page 3 lines 27-28, "Bitmaps are particularly useful in searching table columns over which the index has been built for a particular selection criteria." That is, determines through the use of bitmaps if a table entry satisfies a query.]; and

**returning, as part of a query result set, the retrieved record if the selection criteria is satisfied** [Background, page 4 lines 8-11. Contains I/O activity. Therefore, must return a result of a query.].

**Claim 9:**

The method according to claim 7, wherein the step of running the second task includes the steps of:

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**scanning a column of the table using an index built over the column, wherein the portion of the selection criteria relates to record values within the column** [Background page 3 lines 27-28. Bitmaps are particularly useful in searching table columns over which an index has been built for a particular selection criteria.];

**determining a set of records whose record values within the column do not satisfy the portion of the selection criteria** [Background page 4 lines 1-8, typically scans the index and depending on the value in the corresponding row of that column satisfies the selection criteria a 1 or a 0 is set.]; and

**changing the respective corresponding bitmap element to an inactive value for each record within the set of records** [Background page 4 lines 1-8, setting bitmap element to a 0 if selection criteria not satisfied.].

**Claim 10:**

The method according to claim 7, wherein the step of running a first task includes the step of:

**discarding any record having a corresponding bitmap element which has an inactive value, by not retrieving that record from storage** [Background, page 4 lines 8-11. Entirely avoids retrieving “0” entries, in other words, “inactive” values.].

**Claim 11:**

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The method according to claim 7, further comprising the step of:

**optimizing a query plan for the query by labeling the query as a candidate for dynamic bitmap updating** [Thai, Col. 4 lines 21-24, On the fly updating bitmaps for filtered conditions (i.e. dynamically update bitmaps based on queried conditions)].

**Claim 12:**

The method according to claim 11, further comprising the step of:

**before initializing the bitmap and starting the first task and second task, determining if the query is labeled as a candidate for dynamic bitmap updating** [Thai, Col. 4 lines 9-11, optimization module employs one or more existing indices for optimizing data access.].

**Claim 13:**

Art Unit: 2167

**The method according to claim 9, wherein a first order in which the one or more records is retrieved differs from a second order in which the column of the table is scanned** [Thai, col. 11 lines 5-7, On subsequent operations the filtered out record will no longer be accessed (again as long as that filter remains active).].

**Claims 15-18 have similar limitations to claims 1-4 and are therefore rejected under the same subject matter.**

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**Claim 19:**

The Background discloses **an apparatus for executing a query comprising:**

**at least one processor** [Background, page 2 line2, processors used for performance];

**a memory coupled with the at least one processor**[Background, page 2 lines 3-4, memory coupled to processor]; and

**a database engine residing in the memory and executed by the at least one processor** [Background, page 2 lines 1-2, database management system utilizing computer hardware and software.],

**retrieve records of the table according to the bitmap** [Background, page 4 lines 9-11, if records have 0 (inactive bitmapped entries) then it can avoid retrieving. Whereas the contra positive would be that if it cannot avoid retrieving then the records must be active entries.]; and

**concurrently with retrieving the records, update individual elements of the bitmap according to a portion of the query** [The background, page 4 lines 1-9, discloses while

Art Unit: 2167

executing the query it typically scans the index and builds a bitmap by setting each bitmap element to either a 1 or a 0 depending on the corresponding row of the column that satisfies the selection criteria (i.e. concurrently updating by setting values)].

It is noted that the background does disclose setting bitmaps to an active or inactive value (i.e. 1 or 0); however it does not explicitly disclose that **the database engine configured to initialize each element of a bitmap, corresponding to a table, to an active value.**

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On the other hand, Thai discloses that when a bitmap is created each bit is set to a 1 (it is assumed at the outset that all records meet the specified query condition, i.e. initialized to an active value) [Col. 9 lines 63-65].

Both inventions are directed towards optimizing queries of a database system. Thus, it would have been obvious to one of ordinary skill at the time the invention was made to have modified the Background to have included **the database engine configured to initialize each element of a bitmap, corresponding to a table, to an active value.** A skilled artisan would have been motivated to do so for the purpose of restricting the system to only those records that satisfy the query condition[Thai, Col. 10 lines 2-4].

**Claim 20:**

Art Unit: 2167

**The apparatus according to claim 19, wherein the bitmap includes a respective element for each record of the table** [Thai, Col. 4 lines 24-27, since all records meet filtered conditions (i.e. are set to active value of 1), all records must correspond to a bitmap.].

**Claim 21:**

**The apparatus according to claim 20, wherein the database engine is further configured to analyze the retrieved records to determine if selection criteria of the query are met** [Background, page 4 lines 1-8, if selection criteria is met then a 1 is set, otherwise 0 if not met.].

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**Claim 22:**

**The apparatus according to claim 21, wherein the database engine is further configured to avoid an input/output operation for any record having a corresponding bitmap element set to an inactive value** [Background, page 4 lines 8-11. Entirely avoids retrieving "0" entries, in other words, "inactive" values.].

**Claim 23:**

**The apparatus according to claim 22, wherein the database engine is configured to use a pre-built index related to the portion of the query when updating individual elements of the bitmap** [Thai, Col. 3 lines 29-30, pre-existing index which supports a query].

*Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Background and Thai (U.S. Patent 5,560,007) further in view of U.S. Patent 6,757,670 by Inohara et. al. (hereafter Inohara).*

**Claim 14:**

The background modified with Thai disclose the method of claim 7 and further disclose optimization methods based on indexes; however do not explicitly disclose **collecting statistics related to performance of executing the query and generating a recommendation presented to a user for creating a permanent index based on the statistics.**

On the other hand, Inohora discloses presenting optimization methods from user and using statistic information in Col. 2 lines 43-60.

All inventions are directed towards query optimization. Therefore it would have been obvious to have modified the Background and Thai to include the steps of collecting statistics related to performance of executing the query and generating a recommendation presented to a user for creating a permanent index based on the statistics. A skilled artisan would have been motivated to do so for the purpose of obtaining a good execution plan for a query (Inohora, Col. 3 lines 44-46).

***Conclusion***



The prior art made of record listed on PTO-892 and not relied upon, if any, is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael D. Pham whose telephone number is (571)272-3924. The examiner can normally be reached on Monday - Friday 8am - 4:00pm.

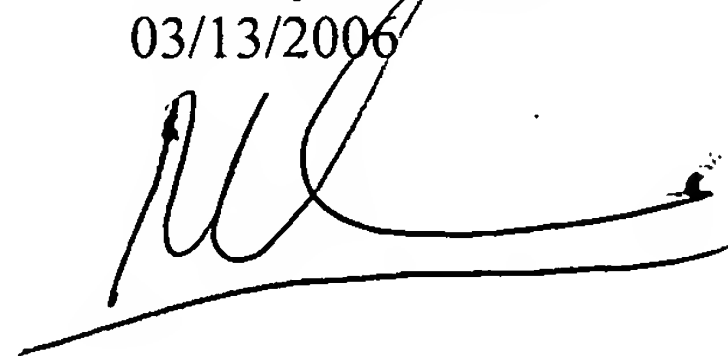
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on 571-272-4107. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Michael Pham  
Art Unit 2167  
Examiner  
03/13/2006

Debbie Le  
Art Unit 2168  
Primary Examiner  
03/13/2006

A handwritten signature in black ink, appearing to be 'Debbie Le', written over the printed name and title.

Application/Control Number: 10/660,167  
Art Unit: 2167

Page 17